Appendix 13.1 Glossary of Technical Terms

A-Weighting: The human ear is not equally sensitive to all frequencies of sound. It is relatively much less sensitive to very low frequencies such as 'mains hum', and to very high frequencies such as the call of a bat, than to the 'mid-frequencies' important for human voice communication. In order to make sound level meters, which would otherwise be indiscriminate in registering sound pressures, respond in a way which reflects human perception of sound, they usually are fitted with a set of filters to progressively filter out the high and low frequency energy. The filters are made to an internationally standardised specification and the filtered noise level is said to be 'A-weighted'. Sometimes A-weighted decibel levels are denoted 'dB(A)', but the correct, internationally standardised format for reporting requires the 'A' to be appended to the noise descriptor e.g. $L_{Aeq,T}$, L_{Amax}, etc.

Airborne Sound: Sound transmitted through the air rather than through the structure of a building or the ground.

Ambient Noise: This is the totally encompassing sound at the measurement position over a specified time interval and usually comprises sound from many different sources both near and far.

Attenuation: A general term used to indicate the reduction of noise or vibration, or the amount (in decibels) by which it is reduced.

Averaging: In the absence of a dominant steady source, the sound level at a point, indoors or outdoors, varies continuously. For example, the variation may be over a few dB about an average value in a quiet room, or over 10dB or more in a noisy outdoor environment. In order to define a level to represent the noisiness of the space it is necessary to define that average value. The most common averaging methods are energy averaging (L_{Aeq}) and statistical averaging (L_{AN} where N is a percentage between 1 and 100).

Background Noise Level, $L_{A90,T}$: Background noise level is a term used to describe that level to which the noise falls during quiet spells, when there is lull in passing traffic for example. It is quantified by the $L_{A90,T}$ which is the noise level that is exceeded for 90% of the measurement time interval, T.

Decibels: Noise conventionally is measured in decibels (dB). The decibel is a logarithmic unit and decibel levels do not add and subtract arithmetically. An increase or decrease of 3dB in the level of a steady noise is about the smallest that is noticeable. It represents a doubling or halving of noise energy. An increase or decrease of 10dB represents a ten-fold change in noise energy, and is perceived as a doubling or halving of loudness.

The threshold of hearing for a typical young, healthy adult is 0dB A-weighted sound pressure level. A noise level of 140dB(A) can cause physical pain. Most people listen to their televisions at about 60 to 65dB(A). Alongside a busy main road the ambient noise level may be in the 70 to 80dB(A) range; on a quiet day in the country it might be as low as 30dB, in town 40 to 50dB(A).

Decibel Addition: If two similar noise sources operate together their combined noise level at an observer's position some distance away is 3dB higher than the noise level generated by just one of them. If two further machines are switched on the noise level generated by all four at the observer's position is 3dB higher than the level generated by the two. If the number of machines is again doubled, to eight, the noise level increases by another 3 dB, and so on.

Equivalent Continuous A-Weighted Sound Pressure Level, $L_{Aeq,T}$: The 'equivalent continuous A-weighted sound pressure level' is an average of the fluctuating sound energy in a space. It is the value of the A-weighted sound pressure level of a continuous, steady sound that, over the specified time period, T seconds, has the same root mean square sound pressure as the varying sound. It can be likened to the mean petrol consumption of a car over a specific journey during which the

instantaneous consumption peaked during periods of acceleration and fell during periods of coasting or braking.

Façade Sound Level: Road and railway traffic noise levels often are specified in terms of the sound level at a position 1m in front of the most exposed façade of potentially noise sensitive premises. Such levels are assumed to be 3dB(A) higher than sound levels measured at an equivalent position away from the reflections from the building and any other surfaces (excluding the ground).

Free-field Sound Level: The free-field refers to sound level measurement positions in an open area well away from any buildings or other sound reflecting surfaces other than the ground. Generally the minimum distance from building facades for free-field measurements is taken to be 3.5m.

Frequency: The number of cycles per second that the sound pressure fluctuates about the ambient static air pressure. High frequency noises are often described as having a high pitch and low frequency noises as having a low pitch. Frequency is measured in Hertz (Hz). The frequency limit of human hearing ranges from 20 Hz to 20 kHz.

Frequency Spectrum: The complete range of frequencies.

Insertion Loss: The difference in sound power level at a particular frequency band of a noise source, measured at the receiver, with and without the sound attenuator in the transmission path between the source and receiver.

Minimum sound Level, L_{Amin}: This is the minimum instantaneous sound level occurring during the measurement period. Because of the standardised response time characteristics of the sound level meter a L_{Amin} level measured on Slow response normally will be a higher value than the same noise measured using Fast response.

Octave Band: The frequency spectrum is measured using an internationally standardised set of octave and one-third octave bands. These bands are identified by their nominal centre frequency specified in Hz (one hertz [Hz] is one cycle per second).

Pure tone: A single frequency tone with no harmonic component and generally considered to be more disturbing than a complex sound at the same level. In cases where the sound level in a single 1/3 octave band is at least 5 dB higher than the level in the frequency band on either side of it, this may be an indication of tonal character in a noise (clause 4.1.3 of BS7445:Part 2:1991).

Rating level, $L_{Ar,Tr}$: The term used in BS4142:1997 to describe the specific noise level plus any adjustment for the characteristic features of the noise.

Residual Noise: The ambient noise remaining at a given position in a given situation when the specific noise is suppressed to a degree such that it does not contribute to the ambient noise.

Resonance: The response of a system (e.g. a thin panel) to an incident sound wave that is close to its natural vibration frequency.

Reverberation: The decay of sound in an enclosed space after the noise source has stopped. Spaces bounded by acoustically hard surfaces (e.g. concrete) will be highly reverberant with the sound taking a long time to fade away due to echoes. Spaces with significant sound absorbent surfaces, such as a room with carpet, curtains and soft furnishings, sound will decay very rapidly and the space will sound much more “dead”.

Specific Noise: The noise of the particular source under investigation.

Vibration: Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement (how far something moves from the equilibrium position), velocity (how fast something moves), or acceleration (the rate of change of velocity). When describing vibration, one must specify whether peak values (i.e. the maximum displacement or maximum velocity) or rms/rmq values (effectively an average value) are used. Standards for the assessment of building damage are usually

given in terms of peak velocity (usually referred to as Peak Particle Velocity, or ppv), whilst human response to vibration is often described in terms of rms or rmq acceleration.

Vibration Dose Value: This is a measure of the amount of vibration that is experienced over a specified period, and has been defined so as to quantify the human response to vibration in terms of comfort and annoyance. The Vibration Dose Value (VDV) is used to assess the likely levels of adverse comment about vibration, and is defined mathematically as the fourth root of the time integral.